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Controlled Flow Instrument For Microwave Assisted Chemistry With High Viscosity Liquids And Heterogeneous Mixtures

Abstract

A controlled-flow microwave instrument is disclosed for chemical synthesis that includes heterogeneous or highly viscous materials. The instrument includes a fluid reservoir for supplying or receiving fluids, a fluid pump in fluid communication with the reservoir for pumping fluids to or from the reservoir, a microwave transparent reaction vessel in fluid communication with the pump for supplying or receiving fluids to or from the pump and the reservoir, a pressure sensor in fluid communication with the reservoir and the vessel for measuring the pressure of fluids in the instrument at the sensor, and a processor in signal communication with the pressure sensor and the pump for controlling the pump and the flow of fluids in the instrument based at least in part on the pressure measured at the sensor. The instrument also includes a magnetic stirrer bar inside the vessel for agitating reactants in the

vessel during exposure to microwave radiation, a first rotating magnet positioned external to and adjacent the cavity to minimize any interaction between the magnetic field of the magnet and microwave propagation in the cavity, and a second rotating magnet inside the cavity for being driven by the first rotating magnet and for driving the rotation of the stirrer bar in the reaction vessel.